

based on a misapprehension, and should be reformulated, as discussed below. Applicant submits that Claims 1 - 14 read on the elected species.

Further, the Examiner is requested to amend the above-identified application as follows:

IN THE CLAIMS:

Please amend Claims 1 and 3 to read as follows. For the Examiner's convenience all the claims in this application, whether amended or unamended, are set forth below. A marked-up copy of the amended claims, showing the changes made thereto, is appended.

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1. (Amended) A charge transfer apparatus comprising:
- a semiconductor region of one conductivity type;
 - a charge transfer region of a conductivity type opposite to the conductivity type of said semiconductor region that is formed in said semiconductor region and joined to said semiconductor region to form a diode;
 - a signal charge input portion adapted to input a signal charge to the charge transfer region;
 - a signal charge output portion adapted to accumulate the signal charge transferred from the charge transfer region; and
 - a plurality of independent potential supply portions adapted to supply a potential gradient to said semiconductor region,

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end

wherein the signal charge in the charge transfer region is transferred
by the potential gradient formed by said plurality of potential supply portions.

2. (Not Currently Amended) An apparatus according to claim 1,
wherein the charge transfer region is completely depleted before the signal charge is input.

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C1

3. (Amended) An apparatus according to claim 2, wherein the charge
transfer region is buried in said semiconductor region and forms a buried diode together
with said semiconductor region.

4. (Not Currently Amended) A charge transfer apparatus comprising:
a semiconductor substrate of one conductivity type;
a well of a conductivity type opposite to the conductivity type of said
semiconductor substrate that is formed in said semiconductor substrate;
a charge transfer region of a conductivity type opposite to the
conductivity type of said well that is formed in said well and joined to said well to form a
diode;
a signal charge input portion adapted to input a signal charge to the
charge transfer region;
a signal charge output portion adapted to accumulate the signal
charge transferred from the charge transfer region; and
a plurality of independent potential supply portions adapted to
supply a potential gradient to said well,

wherein the signal charge in the charge transfer region is transferred by the potential gradient formed by said plurality of potential supply portions.

5. (Not Currently Amended) An apparatus according to claim 4, wherein the charge transfer region is completely depleted before the signal charge is input.

6. (Not Currently Amended) An apparatus according to claim 5, wherein the charge transfer region is buried in said well and forms a buried diode together with said well.

7. (Not Currently Amended) An image pickup apparatus comprising:
a semiconductor region of one conductivity type;
photoelectric conversion portions two-dimensionally arrayed in the semiconductor region;

charge transfer regions of a conductivity type opposite to the conductivity type of the semiconductor region that are interposed between respective columns of the photoelectric conversion portions and form junctions together with the semiconductor region;

transfer electrodes adapted to transfer and inputting signal charges to the charge transfer regions;

signal charge output portions adapted to accumulate the signal charges transferred from the charge transfer regions; and

a plurality of independent potential supply portions adapted to supply a potential gradient to the semiconductor region,

wherein the signal charges input to the charge transfer regions are transferred in a column direction by the potential gradient formed by said plurality of potential supply portions.

8. (Not Currently Amended) An apparatus according to claim 7, wherein each charge transfer region is completely depleted before the signal charge is input.

9. (Not Currently Amended) An apparatus according to claim 8, wherein the charge transfer region is buried in the semiconductor region and forms a buried diode together with the semiconductor region.

10. (Not Currently Amended) An apparatus according to claim 7, further comprising:

a conversion portion, arranged on respective columns, adapted to convert signal charges output to the signal charge output portions on the respective columns into electrical signals of another form; and

a read-out circuit adapted to sequentially read out the electrical signals on the respective columns and forming an image pickup signal.

11. (Not Currently Amended) An apparatus according to claim 10, wherein said conversion portion converts the signal charge into an electrical signal of another form and includes an amplifier formed from an insulated-gate field effect transistor.

12. (Not Currently Amended) An apparatus according to claim 7, wherein said apparatus further comprises:

- charge transfer elements adapted to transfer signal charges output to the signal charge output portions on the respective columns; and
- conversion portion, connected to final output stages of said charge transfer elements, adapted to convert transferred signal charges into electrical signals of another form,

wherein the electrical signals from said conversion means are sequentially read out to form an image pickup signal.

13. (Not Currently Amended) An apparatus according to claim 12, wherein said charge transfer element includes a CCD.

14. (Not Currently Amended) An apparatus according to claim 7, further comprising:

- lens adapted to form light into an image on the photoelectric conversion portions;

A/D converter adapted to convert signals from the signal charge output portions into digital signals; and
a signal processing unit adapted to process the signals from said A/D converter.

15. (Not Currently Amended) An image pickup apparatus comprising:
a semiconductor region of one conductivity type;
photoelectric conversion portions two-dimensionally arrayed in the semiconductor region;
charge transfer regions of a conductivity type opposite to the conductivity type of the semiconductor region that are interposed between respective columns of the photoelectric conversion portions and form junctions together with the semiconductor region;
signal amplifier portions adapted to amplify and output signal charges transferred from the charge transfer regions; and
a plurality of independent potential supply portions adapted to supply a potential gradient to the semiconductor region,
wherein the signal charges accumulated in the photoelectric conversion portions by the potential gradient formed by said plurality of potential supply portions are input to the signal amplifier portions via the transfer regions, and signals amplified by the amplifier portions are output.